AMENDMENTS TO THE DRAWINGS

The attached sheets of drawings are replacement sheets for Figures 9A-9D and 10A-10G (originally Figures 9 and 10).

Attachment: Annotated sheets showing changes
Replacement sheets

REMARKS

This is a full and timely response to the Office Action mailed August 26, 2004, submitting concurrently with a one month Extension of Time to extend the due date for response to December 26, 2004.

By this Amendment, claims 1, 3, 5 and 7-10 have been amended to place the claims in better form under U.S. practice and to more particularly define the present invention. Further, claim 12 has been added to further protect specific embodiments of the present invention. Lastly, claims 2 and 6 have been canceled without prejudice or disclaimer to their underlying subject matter. Support for the claim amendments and new claim can be found throughout the specification and the original claims, see, Examples 1 and 5-7 of the specification and in particular, page 16, lines 13-15, page 24, line 1-3, and page 22, lines 20-22. Claims 1, 3, 5 and 7-12 are pending in this application.

In view of these amendments, Applicant believes that all pending claims are in condition for allowance. Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

Objection to the Drawings

Applicant has amended the labels of Figures 9 and 10 to Figures 9A-9D and 10A-10G as per the Examiner's request. Thus, withdrawal of this objection is respectfully requested.

Objection to the Specification

Applicant has amended the specification to identify in the Brief Description of the Drawings the SEQ ID NOS. of Figures 9 and 10. Applicant has also amended the specification to identify the SEQ ID NOS. for the sequences on pages 25-27 of the specification. Thus, withdrawal of this objection is respectfully requested.

Objection to the Claims

Applicant has amended the claims to address each issue raised by the Examiner. Specifically, claims 1-6 have been amended in accordance with the Examiner's suggestions or canceled. Further, claims 8 and 9 have been amended to introduce the proper article. However, Applicant notes that such an amendment should not limit the "*cell*" and "*seed*" to a singular form

since, under U.S. practice, the article "*A*" means one or more. Lastly, claim 7 has been amended as per the Examiner's request.

Rejections under 35 U.S.C. §112

Claims 1-11 are rejected under 35 U.S.C. §112, second paragraph, for alleged indefiniteness. Applicant respectfully traverses this rejection.

However, in order to expedite prosecution, Applicant has amended claims 1 and 3 to clarify the claimed invention and address the Examiner's concerns. Also, claim 6 has been canceled thereby alleviating the Examiner's concerns. Further, claim 1 has been amended to now direct to a method for producing a transgenic gramineae by transforming a gramineae with the claimed polynucleotide. Also, claim 3 has been amended to clarify that the polynucleotide further comprises the promoter CaMV35S.

Thus, in view of these claim amendments, withdrawal of this rejection is respectfully requested.

Claims 1-11 are rejected under 35 U.S.C. §112, first paragraph, for allegedly failing to enable the claims. Applicant respectfully traverses this rejection.

However, in order to expedite the allowance of the present application, Applicant has amended the claims to direct to a "*polynucleotide is selected from the group consisting of (A) a polynucleotide encoding an amino acid sequence of SEQ ID NO: 1, (B) a polynucleotide encoding an amino acid sequence of SEQ ID NO: 2, (C) a polynucleotide which encodes an enzyme exhibiting nicotianamine amino transferase (NAAT) activity and can hybridize with polynucleotide (A) or (B) under stringent conditions of a hybridization buffer comprising 6 x SSPE, 5 x Denhart solution, 0.1% SDS, and 100 mg/ml altered salmon spermary DNA, and a hybridization temperature of 65 degrees, and (D) a polynucleotide comprising the base sequence of SEQ ID NO. 3*" which Applicant believes satisfy the enablement requirement under U.S. practice.

The Examiner has indicated that the "stringency condition' in the claims, specifically claim 6, includes any low, moderate and high stringency conditions. Applicant has addressed the Examiner's concerns by defining specific hybridization conditions of high stringency *of a hybridization buffer comprising 6 x SSPE, 5 x Denhart solution, 0.1% SDS, and 100 mg/ml altered salmon spermary DNA, and a hybridization temperature of 65 degrees.*

Two experiments in the specification, a transformation with NAAT cDNA (Examples 1 to 4) and a transformation with NAAT genomic DNA (Examples 7 and 8), provide the evidence that a polynuclotide encoding an enzyme exhibiting NAAT activity is capable of inducing iron-deficiency resistance in graminaceous plants. Also, anyone skilled in the art can isolate a polynucleotide that encodes an enzyme exhibiting NAAT activity under stringent conditions in which the hybridization buffer comprises 6 x SSPE, 5 x Denhart solution, 0.1% SDS, and 100 mg/ml altered salmon spermary DNA, and the hybridization temperature is 65 degrees (See Example 5). Therefore, given the teachings in the specification, one skilled in the art can produce the claimed transgenic gramineae having iron deficiency resistance without undue experimentation.

Thus, withdrawal of this rejection is respectfully requested.

Claims 1-11 are rejected under 35 U.S.C. §112, first paragraph, for allegedly lacking written description of the claimed invention. Applicant respectfully traverses this rejection.

However, in order to expedite the allowance of the present application, Applicant has amended the claims to direct to a "*polynucleotide is selected from the group consisting of (A) a polynucleotide encoding an amino acid sequence of SEQ ID NO: 1, (B) a polynucleotide encoding an amino acid sequence of SEQ ID NO: 2, (C) a polynucleotide which encodes an enzyme exhibiting nicotianamine amino transferase (NAAT) activity and can hybridize with polynucleotide (A) or (B) under stringent conditions of a hybridization buffer comprising 6 x SSPE, 5 x Denhart solution, 0.1% SDS, and 100 mg/ml altered salmon spermary DNA, and a hybridization temperature of 65 degrees, and (D) a polynucleotide comprising the base sequence of SEQ ID NO. 3*" which Applicant believes satisfy the written description requirement under U.S. practice.

Thus, withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. §101

Claims 8 and 9 are rejected under 35 U.S.C. §101, for allegedly being directed to non-statutory subject matter. Applicant respectfully traverses this rejection.

However, in order to expedite prosecution, Applicant has amended claims 8 and 9 to a seed or cell comprising the claimed polynucleotide which addresses the Examiner's concerns.

Thus, withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. §102

Claims 1-9 and 11 are rejected under 35 U.S.C. §102(a) as allegedly being anticipated by Satoshi et al. (EP 0860499, hereinafter EP '499). Applicant respectfully traverses this rejection.

To constitute anticipation of the claimed invention under U.S. practice, the prior art reference must literally or inherently teach each and every limitation of the claims. Here, in this case, Satoshi et al. do not teach the claimed limitation "*transforming a gramineae with a polynucleotide by using a vector pIG121Hm or pBIGRZ*".

Thus, withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. §103

Claims 1-11 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Mori Satoshi (*S. Mori , "Reevaluation of the genes induced by iron deficiency in barley roots", Soil Sci, Plant Nutr., 43, pp. 975-980 (1997)*). Applicant respectfully traverses this rejection.

To establish a *prima facie* case of obviousness, the prior art reference must either alone or in combination teach or suggest the invention as a whole, including all the limitations of the claims. Here, like EP '499, Mori Satoshi does not teach the claimed limitation "*transforming a gramineae with a polynucleotide by using a vector pIG121Hm or pBIGRZ*".

Mori Satoshi notes the desire of making "transgenic cultivars tolerant to Fe-deficiency by introducing Fe-regulated genes in the biosynthesis of mugineic acids into plants susceptible to Fe-deficiency" (see page 975, left column, line 11-15, of the reference). However, there is no teaching or suggestion in the reference about how to introduce a gene of an enzyme in the biosynthesis pathway of mugineic acids (especially, a NAAT gene) into plants susceptible to Fe-deficiency (especially, a graminaceous plant).

In order to express a gene in a graminaceous plant, a promoter, vector and terminator suitable for graminaceous plant must be selected, and integrated into a precise construct to express the gene in the graminaceous plant. It was difficult prior to the present application filing date to introduce a gene (especially, a long construct of a gene) into graminaceous plants. In the reference, it is not specified which promoter should be combined with which vector to make a

transformation construct, and how a graminaceous plant should be transformed with the obtained construct.

Further, even though the NAAT gene is expressed in graminaceous plant, it cannot be predicted whether the plant would have iron-deficiency resistance because the expression of the enzyme in the mugineic acid biosynthetic pathway may be harmful to plants. For example, it is well known that excess iron in a plant causes damage to the cell due to the highly reactive radicals produced by the fenton reaction.

On the other hand, the present inventors finally succeed in transformation by using *a pIG121Hm or pBIGRZ* vector, CaMV35S promoter or native NAAT promoter, TNOS terminator or native NAAT terminator and agro-bacterium mediated transformation technique. The present invention demonstrates for the very first time that an iron-deficiency resistant graminae can be obtained when a polynucleotide encoding an enzyme exhibiting NAAT activity is introduced into a gramineous plant. Further, the present invention also unexpectedly demonstrates that the transgenic plants of the present application are able to vigorously grow even in a calcareous alkaline soil.

Thus, for these reasons, withdrawal of this rejection is respectfully requested.

CONCLUSION

For the foregoing reasons, all of the claims now pending in the present application are believed to be clearly patentable over the outstanding rejections. Accordingly, favorable reconsideration of the claims in light of the above remarks is courteously solicited. If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

Dated: December 27, 2004

Respectfully submitted,

By____________________

Lee Cheng
Registration No.: 40,949

RADER, FISHMAN & GRAUER PLLC
1233 20th Street, N.W.
Suite 501
Washington, DC 20036
(202) 955-3750
Attorneys for Applicant

Should additional fees be necessary in connection with the filing of this paper, or if a petition for extension of time is required for timely acceptance of same, the Commissioner is hereby authorized to charge Deposit Account No. 180013 for any such fees; and applicant(s) hereby petition for any needed extension of time.

ANNOTATED SHEETS

FIG. 9A

CTCGATCCCATTGCAATGGTATGATTAGCTATCAAACGAAAGAAAGAGATGGCATGTGCC
CTGTGTGTCATCCCTCACTGGCTTGGCGAATGGCGATACCGAGTTAGGTAGAGTGTTTTT
TTAGCATGATGTCTGCCGGCACTGCCAAGAAAACTGCGTGCAGCGGACTGCAGGAGAGTT
GAGCGATGCATGCTTTGTGATGAGCGGAGCTGAGTGGGTGTCACTAACTGAACCCAATCA
GCATTGGGTGAGTCGAGTCGAGAAGCATCATGCTTCCTGCGTCCCGATCCGCTTATCTTT
TTCTCCCAAATTATTAAAGAGGGATAGATGATGGTGTGCTGGGTTGGGTAGAGTACGTGC
ATAGAACCAAAGCGAGGCGCCGAAAATATGCCGGGGATAATGGTGGCAGGCCGCAACGGC
CACGCCCGTCAGCTGGCAGCGGCGTGCCAGAGCGTGCCAGAGCGTGCGCGCGTGCGTGCT
TCTTGCTGCCGGCCCCGGTTCGTGTGCGGTCAGAGCAACGGCTATATAGGACCGTCAATC
ACCGCTACTCAATCCGTCCCCAACTCGTTTCCTATTACCGCTACTAGTAGTATTCCTGGT
GTAGTCTAGTAGTACTCCTCCTCCTCCTTCTCCTCCTACCCGTTTCCTCATGGCCACCGT
ACGCCAGAGCGACGGAGTCGCCGCGAACGGCCTTGCCGTGGCCGCAGCCGCGAACGGCAA
GAGCAACGGCCATGGCGTGGCTGCCGCCGTGAACGGCAAGAGCAACGGCCATGGCGTGGA
TGCCGACGCGAACGGCAAGAGCAACGGCCATGGCGTGGCTGCCGACGCGAACGGCAAGAG
CAACGGCCATGCCGAGGCCACTGCGAACGGCCACGGCGAGGCCACTGCGAACGGCAAGAC
CAACGGCCACCGCGAGAGCAACGGCCATGCTGAGGCCGCCGACGCGAACGGCGAGAGCAA
CGAGCATGCCGAGGACTCCGCGGCGAACGGCGAGAGCAACGGGCATGCGGCGGCGGCGGC
AGAGGAGGAGGAGGCGGTGGAGTGGAATTTCGCGGGTGCCAAGGACGGCGTGCTGGCGGC
GACGGGGGCGAACATGAGCATCCGGGCGATACGGTACAAGATCAGCGCGAGCGTGCAGGA
GAAGGGGCCGCGGCCCGTGCTGCCGCTGGCCCACGGGGACCCGTCCGTGTTCCCGGCCTT
CCGCACGGCCGTCGAGGCCGAGGACGCCGTCGCCGCCGCGCTGCGCACCGGCCAGTTCAA
CTGCTACCCCGCCGGCGTCGGCCTCCCCGCCGCACGAAGGTAACAACAACAACAACACAA
GAACAATTTCCTTTTCGCGTGTCGTGTCGCGCGGCAATCCATGCATGCGCATGTGCCGCT
TTCACGTGTCCGTCCGTCCGTCCACCGTTCCTTCCTCCTCCCTACGCCCATGAGAAATCT
GACCTTCTCCCACCTTATACCAAACAAAACAAAAAAACACAGCGCCGTGGCAGAGCACCT
GTCGCAGGGCGTGCCGTACATGCTATCGGCCGACGACGTCTTCCTCACCGCCGGCGGGAC
CCAGGCGATCGAGGTCATAATCCCGGTGCTGGCCCAGACCGCCGGCGCCAACATTCTGCT
CCCCAGGCCAGGCTACCCAAACTACGAGGCGCGCGCCGCGTTCAACAGGCTGGAGGTCCG
GCATTTCGACCTCATCCCCGACAAGGGGTGGGAGATCGACATCGACTCGCTGGAATCCAT
CGCCGACAAGAACACCACCGCCATGGTCATCATAAACCCCAACAACCCGTGCGGCAGCGT
TTACTCCTACGACCATCTGTCCAAGGTTTCACATCCTTTGCCTTGCTGAATATGGATTCA
GTTCAGTGCACCTGCTGAATTCTTTTTGCCAATCGCATACTGACTGATGTTGCTCAATTA
GGTCGCGGAGGTGGCGAAAAGGCTCGGAATATTGGTGATTGCTGACGAGGTATACGGCAA
GCTGGTTCTGGGCAGCGCCCCGTTCATCCCAATGGGAGTGTTTGGGCACATCACCCCTGT
GCTGTCCATAGGGTCTCTGTCCAAGTCATGGATAGTGCCTGGATGGCGGCTTGGATGGGT
AGCGGTGTACGACCCCAGAAAGATCTTACAGGAAACTAAGGTACTTAAATCTCTATATCA
TTCTTTTCAAATGCTACTAAGGTGATTAATTAGTACTACTGTACAATATATTTGCTAAAT
TTGTACTGACATTTTTGTGGTAGATCTCTACATCAATTACGAATTACCTCAATGTCTCGA
CAGACCCAGCAACCTTCATTCAGGTCAGTCTTTGGTATTTACCTCGTTTCAAGAAATAAA
GTCTTTGGTATTTACTCCTCCTTGTCCTATTTTGCTCCGGTCCCTATGTTGTAGGCAGCC
CACGTGCATGTCAAGTGACCGTTTTTTCACATTAAGTTTGAAAGTCAAAGTCAGACACAT
ACACTTGTAGTTATTTTACCTTTGTTTGCTTTGATCCGATAAAATAAAAAAATACAAAAA
CTGAACCTACTGTTGAATATAACCACTGTTCTTACAAGATATACATGATTGCACTATGGG
CATGCCATATTCTTTTGGGTCAAGTATGCAGTATGTTGGAACCTCTTTTAGAAAATAGAT
ACATTGTACTATGAGTATACCATTTTATTAAGAATTTCATATTTTGATATCCTTGATGGT
ATTGTTCTCTTGTGATTCACACGATTTACTTGTGGTTTTTTGTACTATCAAATTGTTCAG
GCAGCTCTTCCTCAGATTCTTGAGAACACAAAGGAAGATTTCTTTAAGGCGATTATTGGT
CTGCTAAAGGAATCATCAGAGATATGCTACAAACAAATAAAGGAAAACAAATACATTACA
TGTCCTCACAAGCCAGAAGGATCAATGTTTGTCATGGTAAGCCTATTTTGTGAAGTAAAA
AAATCTTAGGGAGTGTCAGTAATCATAAACTTATTTATATAGGATTAATCTGGACCGAA

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FIG. 9B

ATGCATCCAACATAATTACTTCAAATTCAAATTCAAATTACATTCTTCCGTACATATTTT
TGAAGATGCATGTATTTTAAGAATAATGACGAGAGCTAAAGTTATGCTACGACTAATCAT
CTGGATATCCTTTGTCCATCTTTTTGTTATACTGTGGAATGTTAATGGTCAAATCATATT
ACACAAATATCCATGCTAGTTTCTAGAAAGATTGATTATTTTTCTGTAACCATGAACTCC
GTATTAACTTCCATGTAAACAGGTGAAACTGAACTTACATCTTTTGGAGGAAATAGACGA
TGACATTGATTTTTGCTGCAAGCTCGCAAAAGAAGAATCAGTAATCTTATGCCCAGGTAG
GAATCCATTGTTGATTTTTGACTGTATATGAAGTTCTTATCAATTTCCGAGATGACTATA
CATATAAATGATTACCATATTATGGTCAGAAATTGTATAACAGTGTTAGAATATTCTGTG
AAGACTTTTTTAACACAATATTCTGTGAAGACTAGATATCATGTACTTCTCCTTGTTTTC
TTGACCTGATGTCCTTCGTCACATGTTGTGCTCCTCACAAAAAAATAGCAAGCACATGTT
TCAAATAATTGTTAATAATATAATTTAGCCTTTAATTTATATGGTTCTATTTTGAGATAT
TTTTGTAGTCCAACTTATATATTTGTGACTATTCTCAAAAACAAAACTTATATATGTGTG
CCTCTCAAATGTAGGGAGTGTTCTTGGAATGGCAAACTGGGTCCGCATTACTTTTGCTTG
TGTTCCATCTTCTCTTCAAGATGGTCTCGGAAGGATCAAATCATTCTGTCAAAGGAACAA
GAAGAGAAATTCGAGCGATGATTGCTAGTTGTATATCTGACTGAAGCTGTAAATCATTCC
CAGTATCCCCATCTATATCTTTCAATAAAATGGAACTTTTAGTTCTCTATGAATAGAAGT
CAACATCTCCTTGAATATGTTCTGGTTGTTGTGGCCTGGACGAAACATAGTGAATGTTAT
GTTAGTGAAGTTACATTGGCGTCGAAGATCTTTGAAGTTTTTTTTTTTTTTTGGGGGGGG
GGGGGGGGGTGCTTTGATATTACTCTTAAGTACACGTTCTCTCAAGTTATGTCAAAGCA
CTTTGTAAACAATTGTAGATTTGGTATCATGATATGGATTAAACTAGTCAGATACTTGGT
AAGCACAAACCCTACCTATGTTAGGCTCACTAAGGTGGCGTTTGGTTCGAGAGAGAGGAA
GGATCAGTTGATGATATCCCCAATCATCGAAGTAAATCATGTGTTGTTGCTACCACTTTT
CTACAATCCTAGTAGCTGCATGCGTTGAGCTACTGATCAACACCACTGCACAACCATATT
CTCTGTGCAAAATCGGCACCCAAAGATTACATCTCACAGCTGAAGCAACCACCAAATTTG
AAGAGAGGAACCCTCACAAAGACCTTTGAGTGCCCCCCACAATGCATGGTTAGGCCGCCG
TCGCAGGCCGGAGTGGTCACCATGCGGACCAACACCAACTCCAACGGGGGAGCACGTCAC
CGATTACTGAAATTCCCCAAACAATTCTTAATTTGTGAACAAAATTTAAAAACAGGAACA
ATTTTTGAATTTGTGAACAAATTTTTTAAACGGGTATTCCTGAACATTTTTCAAAATTGT
GATCAAAATTTTAAAACGACTTCTTTCTCAAATTTGAGCAATATTTAAAATTATAAAAAA
GTTCAACAATTTTGAACTTTTTAAAAATTAGCGAGAACATTTTGAAATTCTAAATATTTT
CGAATTTGGAACATTTTTTCTATTTCTGAACAAAAATTGAAAATACGAACGTAATTTGGA
ATAAATTTTGGAAAATGCGATTTTTTGAAATTTCTGAACATATTTTGAAAAACAAAAAAA
CTTTAAAAGGTAAAATAAAAATAAAATAAAAATAGAAACATAAAAATAAGCAAAAAAATA
AAAGAAATCCGAGAAAAGCCAACTGGAATAGCACATGGAAAAACCCAGCCGTCCGCCGC
ACTGTGTAAAGCTATAAGTGAGCCGGCCCAAGCCTCGTCGTCTCATCATACCCTGTGCGA
AACCCCGACAATTCGTTGCACTATGCGGCGAATAGGCTTTTCCAGGAGCTCCTGTCTTCC
GGTTATGGGTCATTTGCACACCCCTCCTCCACTTGGGCCAGGCTATTATACTTTTTTTCC
TTCTTTCGACCTCACGTTACTACGCCAGTTTAGTTTTGGAAGCGACCAACCGGTTTTGT
GAAGGTTCTAGAAACTCAACCATTTTTGGGAAGCTTCTAGAAGCCTATGAATGTTTCTTT
TGGACATGTATTATTTGTGTTTTTTCTTTTTCAAATTGCACAATCTTTTTTCAAATTCAT
GATTTTTGTGAAACTTGTGATTTTTTGAATCCGTGATTTTTTTTCCTAAATCCGTGTTTT
GAAAAAAACTGTGGACTTTTCCGAAATTAATGAACATTTGTTTGCAAGATCGATGATCCT
TTTCAAATGAGCGATTTTTTTCTAAAATATCCACATATTTTTCATATTCATAAGCTTTCC
TTTTAATCGTGAACTATCTTAGCATTTGGTGAACTTTTATTAATTTTCTTTATAAAATGA
TTTTTTTTCAAAAGCCAACGGTTAACGGTTGACCGCTGAACCACAACCACAAACCGGGGA
AACCATTGACTCGCTGAACAGGGCAGGGCTTTCATATGATTGGGTGGTCTAATACCAGCG
CCCCTGACTACTAAACGAAGGAATTGCAAATTTTACCAACCACTACTATGGTAAAAAATG
AATATCACGATAAAAAAGGGGAAAAAAAACTATACCCTGAAAATCCCTCTGTTTCTAAAT
ATTTGTTGTTGGGGAGAACTAATCTGAAAGAACTAATCTAGTTCTCCGCAATAACAAATA
TTATGATTCGGGGGGAGTATAACTATTACACGATCAACCAAAGAATGTCCTCCAAGAAAA
ACCCAAAGAAAGTGCTAGAGTTTTGTTTTCAAGGACCGAAAGATAGAGATAGCATTCTGA
ATTAGGTCCATCTTTTTCCCAAGGATTGAAAGAAAGAGATAGAATTCTGAATTAGGTGCG

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FIG. 9C

GAGATATCATTTCTGGATTAGGTACAATTGTTTTGCCGGCACAGCCAAACCCCGCAGTGG
AGCCGGAATTGGAATTGAGTGGGTGGAGTCGAGAAGCATGGTTCATGCGTTCTCAAAGAG
TGTAGCCAGTAGTGTGTGCTCCTTGGTGCTGGAGCTGCATATACAAGTACATAAAACAAA
GACGATCAGCTGGCAGCGTGCCTGCATGCGTGCTTCTTGCTGCCGCCCCGGAAGCCCCGG
TTGATGTGCGCAGGCGAGTGGCGACGGACCGACGGCTATAAAGCACGGCCAAGCACCGC
CGCCGTTCTCAATCCATCCATCCCTTAGCTGATTTGATTGACTAGCTAGTTCATTCCCTG
CCACACTGCTAGTACTCCTCCTCGTTTCCTCGTGGCAATGGTACACCAGAGCAACGGCCA
CGGCGAGGCCGCCGCCGCCGCCGCCAACGGCAAGAGCAACGGGCACGCCGCCGCCGCGAA
CGGCAAGAGCAACGGGCACGCGGCGGCGGCGGCGGTGGAGTGGAATTTCGCCCGGGGCAA
GGACGGCATCCTGGCGACGACGGGGGCGAAGAACAGCATCCGGGCGATACGGTACAAGAT
CAGCGCGAGCGTGGAGGAGAGCGGGCCGCGGCCCGTGCTGCCGCTGGCCCACGGTGACCC
GTCCGTGTTCCCGGCCTTCCGCACGGCCGTCGAGGCCGAGGACGCCGTCGCCGCCGCGCT
GCGCACCGGCCAGTTCAACTGCTACGCCGCCGGCGTCGGCCTCCCCGCCGCACGAAGGTA
ACATTTACAGCTTCACCGTAATGTATGCGTGAGCATGCATGCGCCGGTTTACTTACGTGC
CCGCCGCTGTTCTTCCCCGGTGCGTTCAAAATTTTAACCTTCTATAAGTACCTTATAAAA
ACAAACAGCGCCGTAGCAGAGCACTTGTCACAGGGCGTGCCCTACAAGCTATCGGCCGAC
GACGTCTTCCTCACCGCCGGCGGAACTCAGGCGATCGAAGTCATAATCCCGGTGCTGGCC
CAGACTGCCGGCGCCAACATACTGCTTCCCCGGCCAGGCTATCCAAATTACGAGGCGCGA
GCGGCATTCAACAAGCTGGAGGTCCGGCACTTCGACCTCATCCCCGACAAGGGGTGGGAG
ATCGACATCGACTCGCTGGAATCCATCGCCGACAAGAACACCACCGCGATGGTCATCATA
AACCCAAACAATCCGTGCGGCAGCGTTTACTCCTACGACCATCTGGCCAAGGTTTTGCAT
CCATGCATCCTCTGCCTCGTTGATCGACCGGTCTGTTTGAACATAGTATATGGATTGCGT
TTGCTAATCGTGTGCTGATGATGCTGTTTGGTTATCAGGTCGCGGAGGTGGCAAGGAAGC
TCGGAATATTGGTGATCGCTGACGAGGTTTACGGCAAACTGGTTCTGGGCAGCGCCCCGT
TTATCCCGATGGGCGTCTTTGGGCACATTGCCCCGGTCTTGTCCATTGGATCTCTGTCCA
AGTCGTGGATAGTGCCTGGATGGCGACTTGGATGGGTGGCGGTGTACGACCCCACAAAGA
TTTTAGAGAAAACTAAGGTAGCTTTAGCTCCCTATCATTCTTCTCATATGCTACTGTGGG
GATTAGTATTTTTGCTAAATTTGTACTGCCTTTGTTTATTCAGATCTCTACGTCTATTAC
GAATTACCTTAATGTCTCAACGGACCCAGCAACCTTCGTTCAGGTTAGTCTTTGGTTCTT
GCCCTATTTTGCTCATGTCCCTGTGTTGCATGTCAAATGACCGGCTTCAAGTTAGTATAT
AGAGTTTTTGTTAAGTGTGAATGTCGAAGTCCAACATGATGGAAGAAAGATACATCTATT
TTTAGTCATTCCCCTTTGTTTGTTTGATTCCATAAAATAAATAAACACAAAGCCAGAACC
AACTATTGAATAGAACTATTTTTCTTAGAAAATATACATTGTATTTTGAGCATGCCATAT
TCTTTTCGATCAAGTATGCAATATATTAAAACTTGCATTGTACTACGAGTATACCATGTT
GTTAAGAATTTCTTTACCTACAACACCTTGTCTCGCATCTTCATATTTTGATATCCTTGA
CATTATTGTTCTCTTATGATTCACACAACTTAATTATGGATTTTTGTGCTATCAAATTGT
TTAGGAAGCTCTTCCTAAAATTCTTGAGAACACAAAAGCAGATTTCTTTAAGAGGATTAT
TGGTCTACTAAAGGAATCATCAGAGATATGTTATAGGGAAATAAAGGAAAACAAATATAT
TACGTGTCCTCACAAGCCAGAAGGATCGATGTTTGTAATGGTAAGCTAAGCATAGACTTA
CTTTTTAAGGTTAATCTGGGATCTCAGTGCATCCAACAAACAATCAAATCAAAATATAAT
TATGTTTTGCTATGGATCTTTTTGAAGATGCATGCATTTGAAGAATAATGAAGAGAGTTG
AAATTATTTTAGGACTAATCTTCCTGATATCATTTGTCCATTTTTTTGTTATTACTGTAA
ATTGGTAACACTCAAATCATATTACAAAAAGTTTCCTCCCATTTTTAGTAAGATTGACTT
CCTTTCTATAACCATGTATTAACTTCCATGTAAACAGGTCAAACTAAACTTACATCTTTT
GGAGGAGATCCATGACGACATAAATTTTTGCTGCAAGCTCGCAAAGGAAGAATCTGTAAT
TTTATGTCCAGGTAGGAATGTATATGGCCATTTTAAAGGAAAACTATATGGAATAATAAT
ATCTTCTTGTTATACTAAACAATACTTCCTCCATCCTAAAATAAATGTCTTACACTTAGC
ACAATTTTATACTAGATCTAGTACAAAGTTGAAACAGTTATTTTGGACAGAGGGAGTAG
TATATATTGTGTGAGAACATAAGGTTATGTTTGACTGATATATGCTTCTTAAATGTGAAA
CATGTTCTCTTATGTTTTTTGATTGTATACGAAGTTCTTATCAGTTTCCGAGATGACTAC
ACATAAATGATTACCATATCATTGTCAGAAAATGTATTACCACATTAGAATATTCTTTCT
TTTTATGCAAAGACTAGCATGGCATGTACTTTTCCTTGTACCTATGTGTCTTTTTTTTTC

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FIG. 9D

TCGTTACATGTTTGTGCTTCTCACAAAAATAATAATACCAAGCACATGTTCCAAATGATT
ATTAATAATTTTGAGGTGTTTTTCAACCAACTTATATACTTTCATAGTTCTAAAAAAACC
GTATATATGGTTAACTCTAACAAAAACTTATATATGTTTTCTCTCTAATACAGGGAGTGT
TCTTGGAATGGAAAATTGGGTCCGTATTACTTTTGCCTGCGTTCCATCTTCTCTTCAAGA
TGGACTCGAAAGGGTCAAATCATTCTGTCAAAGGAACAAGAAGAAGAATTCTATAAATGG
TTGTTAGTTGTACACACCCCTAGTTGTACATCTGACTGAAGCTGTAAATCATTTCTAGTT
ATCCCCATTTATATATTTCAATAAAACATATTGTAATGGTTCTGTTGTAGCTGTCCAAGT
CATGTACTCTACTTTTTGATGTATTTGGCCTCATTGCCTTGCATCAGTTTCAATAAAAAT
GGTTGTGTACACAATGATGATGTAGAGGCGAGGTGTTTTGACCACCTTTTCAACAAAAAT
CTATATCTTTCAACAAATGAAACCTTGAGTTCCCTTTGAGTAGAAGTCAACATACTCCTT
GAATATGCTATGGTTTCCATGGTCTGGATGAAACATGATGAATAGAAGTGAAGTTATATC
CATGTCAAAGTTTTTTAATGTTTAATTTCATTATGAGAACTTTGATATTACTTCTAGCAC
ACATTCTCTGAAGTAATTGTCAGTTTGGTACTTGAAGGGACCTATATTTTTCCTATTGGG
GGGGGGGGGTGAATAGGCGGTTTATAACCAATTGTATATTTGAGAATATCTTAATGTGGA
ATTAAACTAGGTGAATATTTTTTCCAATAAAGGGTGCTTTTATTGACTCACAATGTACCA
TCAAGGGATACAATCATAATGAGTACACAATCGACATCTACATAATCAGGTTGCATACGG
CCAACACACACACACGCACACACACATTCACACACACAAATCATGCTGACGAAGAGCGAA
GTCATACAAGATCAAAACTATGCCTAGGCGGAGGAAGAATAGAAAAACATGAAGAAATGA
AAAACCGTGACTGACAACATACTGACCATCGACGACAAACATCTGTAGACAACACAAAAA
CTGCGAGAAAAGTTCTATAAAACTGGCGCCTTCGAGAAGGAAACGACGTGCAAGAGTTGC
CATCATCGGATCCAACCACTAAGGTCATATCCTGGGTTTTCATCCTGAAGATCAAATCCG
AGCAAACTCCGAGTAATGTCTTTATTAGGGTAACGATTCAAAAAATGCCACAATCATGAG
TTATGACCAATTAGACCAGACCTAGGATTTTTATCCAAAGCTCGAGACGGGTACTCTAGA
AGTACCATCCAATTGAAGTCATCCCACTTGCCTCAATACAAATAGTTGCATAGATGCACG
GTCCATATGGCGAGTAATGGACATGAGCGCGCATGTGTAGGTTAACGTGACGTGACAAGA
GCCTGTCGCCACCACTCGACGAAGTGTTTGATGGGGAGGAAGAAGTATGGCTCCACCAAC
ATCCCAAGTTTGAAACATTCTAGAGCCCCTTACCATACTCACAAAGCGACAATTGATGAC
TATCTGTATCAGACGACAAATCCATGTCCGTCACTCGCTCTATCTTGGTCATTGACATAC
TACCTGGCAAAGGCGGATTCAAGCCCCAGACAGCCTGGGCGGCCGC

FIG. 10A

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ctcgatcccattgcaatggtatgattagctatcaaacgaaagaaagagatggcatgtgcc
ctgtgtgtcatccctcactggcttggcgaatggcgataccgagttaggtagagtgttttt
ttagcatgatgtctgccggcactgccaagaaaactgcgtgcagcggactgcaggagagtt
gagcgatgcatgctttgtgatgagcggagctgagtgggtgtcactaactgaacccaatca
gcattgggtgagtcgagtcgagaagcatcatgcttcctgcgtcccgatccgcttatcttt
ttctcccaaattattaaagagggatagatgatggtgtgctgggttgggtagagtacgtgc
atagaaccaaagcgaggcgccgaaaatatgccggggataatggtggcaggccgcaacggc
cacgcccgtcagctggcagcggcgtgccagagcgtgccagagcgtgcgcgcgtgcgtgct
tcttgctgccggccccggttcgtgtgcggtcagagcaacggctatataggaccgtcaatc
accgctactcaatccgtccccaactcgtttcctattacCGCTACTAGTAGTATTCCTGGT 600

GTAGTCTAGTAGTACTCCTCCTCCTCCTTCTCCTCCTACCCGTTTCCTCATGGCCACCGT
                                                 M  A  T  V  NAAT-B

ACGCCAGAGCGACGGAGTCGCCGCGAACGGCCTTGCCGTGGCCGCAGCCGCGAACGGCAA
 R  Q  S  D  G  V  A  A  N  G  L  A  V  A  A  A  A  N  G  K

GAGCAACGGCCATGGCGTGGCTGCCGCCGTGAACGGCAAGAGCAACGGCCATGGCGTGGA
 S  N  G  H  G  V  A  A  A  V  N  G  K  S  N  G  H  G  V  D

TGCCGACGCGAACGGCAAGAGCAACGGCCATGGCGTGGCTGCCGACGCGAACGGCAAGAG
 A  D  A  N  G  K  S  N  G  H  G  V  A  A  D  A  N  G  K  S

CAACGGCCATGCCGAGGCCACTGCGAACGGCCACGGCGAGGCCACTGCGAACGGCAAGAC
 N  G  H  A  E  A  T  A  N  G  H  G  E  A  T  A  N  G  K  T

CAACGGCCACCGCGAGAGCAACGGCCATGCTGAGGCCGCCGACGCGAACGGCGAGAGCAA
 N  G  H  R  E  S  N  G  H  A  E  A  A  D  A  N  G  E  S  N

CGAGCATGCCGAGGACTCCGCGGCGAACGGCGAGAGCAACGGGCATGCGGCGGCGGCGGC
 E  H  A  E  D  S  A  A  N  G  E  S  N  G  H  A  A  A  A  A

AGAGGAGGAGGAGGCGGTGGAGTGGAATTTCGCGGGTGCCAAGGACGGCGTGCTGGCGGC
 E  E  E  E  A  V  E  W  N  F  A  G  A  K  D  G  V  L  A  A

GACGGGGGCGAACATGAGCATCCGGGCGATACGGTACAAGATCAGCGCGAGCGTGCAGGA
 T  G  A  N  M  S  I  R  A  I  R  Y  K  I  S  A  S  V  Q  E

GAAGGGGCCGCGGCCCGTGCTGCCGCTGGCCCACGGGGACCCGTCCGTGTTCCCGGCCTT 1200
 K  G  P  R  P  V  L  P  L  A  H  G  D  P  S  V  F  P  A  F

CCGCACGGCCGTCGAGGCCGAGGACGCCGTCGCCGCCGCGCTGCGCACCGGCCAGTTCAA
 R  T  A  V  E  A  E  D  A  V  A  A  A  L  R  T  G  Q  F  N

CTGCTACCCCGCCGGCGTCGGCCTCCCCGCCGCACGAAGgtaacaacaacaacaacacaa
 C  Y  P  A  G  V  G  L  P  A  A  R  S

gaacaatttccttttcgcgtgtcgtgtcgcgcggcaatccatgcatgcgcatgtgccgct
ttcacgtgtccgtccgtccgtccaccgttccttcctcctccctacgcccatgagaaatct
```

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FIG. 10 B

```
gaccttctcccaccttataccaaacaaaacaaaaaacacagCGCCGTGGCAGAGCACCT
                                           A  V  A  E  H  L

GTCGCAGGGCGTGCCGTACATGCTATCGGCCGACGACGTCTTCCTCACCGCCGGCGGGAC
 S  Q  G  V  P  Y  M  L  S  A  D  D  V  F  L  T  A  G  G  T

CCAGGCGATCGAGGTCATAATCCCGGTGCTGGCCCAGACCGCCGGCGCCAACATTCTGCT
 Q  A  I  E  V  I  I  P  V  L  A  Q  T  A  G  A  N  I  L  L

CCCCAGGCCAGGCTACCCAAACTACGAGGCGCGCGCCGCGTTCAACAGGCTGGAGGTCCG
 P  R  P  G  Y  P  N  Y  E  A  R  A  A  F  N  R  L  E  V  R

GCATTTCGACCTCATCCCCGACAAGGGGTGGGAGATCGACATCGACTCGCTGGAATCCAT
 H  F  D  L  I  P  D  K  G  W  E  I  D  I  D  S  L  E  S  I

CGCCGACAAGAACACCACCGCCATGGTCATCATAAACCCCAACAACCCGTGCGGCAGCGT 1800
 A  D  K  N  T  T  A  M  V  I  I  N  P  N  N  P  C  G  S  V

TTACTCCTACGACCATCTGTCCAAGgtttcacatcctttgccttgctgaatatggattca
 Y  S  Y  D  H  L  S  K

gttcagtgcacctgctgaattctttttgccaatcgcatactgactgatgttgctcaatta
gGTCGCGGAGGTGGCGAAAAGGCTCGGAATATTGGTGATTGCTGACGAGGTATACGGCAA
 V  A  E  V  A  K  R  L  G  I  L  V  I  A  D  E  V  Y  G  K

GCTGGTTCTGGGCAGCGCCCCGTTCATCCCAATGGGAGTGTTTGGGCACATCACCCCTGT
 L  V  L  G  S  A  P  F  I  P  M  G  V  F  G  H  I  T  P  V

GCTGTCCATAGGGTCTCTGTCCAAGTCATGGATAGTGCCTGGATGGCGGCTTGGATGGGT
 L  S  I  G  S  L  S  K  S  W  I  V  P  G  W  R  L  G  W  V

AGCGGTGTACGACCCCAGAAAGATCTTACAGGAAACTAAGgtacttaaatctctatatca
 A  V  Y  D  P  R  K  I  L  Q  E  T  K

ttcttttcaaatgctactaaggtgattaattagtactactgtacaatatatttgctaaat
ttgtactgacattttgtggtagATCTCTACATCAATTACGAATTACCTCAATGTCTCGA
                        I  S  T  S  I  T  N  Y  L  N  V  S

CAGACCCAGCAACCTTCATTCAGgtcagtctttggtatttacctcgtttcaagaaataaa
T  D  P  A  T  F  I  Q

gtctttggtatttactcctccttgtcctattttgctccggtccctatgttgtaggcagcc 2400
cacgtgcatgtcaagtgaccgtttttcacattaagtttgaaagtcaaagtcagacacat
acacttgtagttattttacctttgtttgctttgatccgataaaataaaaaaatacaaaaa
ctgaacctactgttgaatataaccactgttcttacaagatatacatgattgcactatggg
catgccatattcttttgggtcaagtatgcagtatgttggaacctcttttagaaaatagat
acattgtactatgagtataccattttattaagaatttcatattttgatatccttgatggt
attgttctcttgtgattcacacgatttacttgtggtttttgtactatcaaattgttcag
GCAGCTCTTCCTCAGATTCTTGAGAACACAAAGGAAGATTTCTTTAAGGCGATTATTGGT
 A  A  L  P  Q  I  L  E  N  T  K  E  D  F  F  K  A  I  I  G
```

FIG. 10C

CTGCTAAAGGAATCATCAGAGATATGCTACAAACAAATAAAGGAAAACAAATACATTACA
L L K E S S E I C Y K Q I K E N K Y I T

TGTCCTCACAAGCCAGAAGGATCAATGTTTGTCATGgtaagcctattttgtgaagtaaaa
C P H K P E G S M F V M

aaatcttagggagtgtcagtaatcataaacttatttatataggattaatctgggaccgaa 3000
atgcatccaacataattacttcaaattcaaattcaaattacattcttccgtacatatttt
tgaagatgcatgtattttaagaataatgacgagagctaaagttatgctacgactaatcat
ctggatatcctttgtccatctttttgttatactgtggaatgttaatggtcaaatcatatt
acacaaatatccatgctagtttctagaaagattgattatttttctgtaaccatgaactcc
gtattaacttccatgtaaacagGTGAAACTGAACTTACATCTTTTGGAGGAAATAGACGA
V K L N L H L L E E I D D

TGACATTGATTTTTGCTGCAAGCTCGCAAAAGAAGAATCAGTAATCTTATGCCCAGgtag
D I D F C C K L A K E E S V I L C P

gaatccattgttgatttttgactgtatatgaagttcttatcaatttccgagatgactata
catataaatgattaccatattatggtcagaaattgtataacagtgttagaatattctgtg
aagactttttaacacaatattctgtgaagactagatatcatgtacttctccttgttttc
ttgacctgatgtccttcgtcacatgttgtgctcctcacaaaaaatagcaagcacatgtt 3600
tcaaataattgttaataatataatttagcctttaatttatatggttctattttgagatat
ttttgtagtccaacttatatatttgtgactattctcaaaaacaaaacttatatatgtgtg
cctctcaaatgtagGGAGTGTTCTTGGAATGGCAAACTGGGTCCGCATTACTTTTGCTTG
G S V L G M A N W V R I T F A C

TGTTCCATCTTCTCTTCAAGATGGTCTCGGAAGGATCAAATCATTCTGTCAAAGGAACAA
V P S S L Q D G L G R I K S F C Q R N K

GAAGAGAAATTCGAGCGATGATTGCTAGTTGTATATCTGACTGAAGCTGTAAATCATTCC
K R N S S D D C *
CAGTATCCCCATCTATATCTTTCAATAAAATGGAACTTTTAGTTCTCTATGAATAGAAGT

CAACATCTCCTTGAATATGTTCTGGTTGTTGTGGCCTGGACGAAACATAGTGAATGTTAT

GTTAGTGAAGTTAcattggcgtcgaagatctttgaagttttttttttttttgggggggg

gggggggggtgctttgatattactcttaagtacacgttctctcaagttatgtcaaagca
ctttgtaaacaattgtagatttggtatcatgatatggattaaactagtcagatacttggt 4200
aagcacaaaccctacctatgttaggctcactaaggtggcgtttggttcgagagagaggaa
ggatcagttgatgatatccccaatcatcgaagtaaatcatgtgttgttgctaccactttt
ctacaatcctagtagctgcatgcgttgagctactgatcaacaccactgcacaaccatatt
ctctgtgcaaaatcggcacccaaagattacatctcacagctgaagcaaccaccaaatttg
aagagaggaaccctcacaaagacctttgagtgcccccacaatgcatggttaggccgccg
tcgcaggccggagtggtcaccatgcggaccaacaccaactccaacgggggagcacgtcac
cgattactgaaattccccaaacaattcttaatttgtgaacaaatttaaaaacaggaaca
atttttgaatttgtgaacaaatttttaaacgggtattcctgaacatttttcaaaattgt
gatcaaaattttaaaacgacttctttctcaaatttgagcaatatttaaaattataaaaaa
gttcaacaattttgaactttttaaaaattagcgagaacattttgaaattctaaatatttt 4800
cgaatttggaacatttttctatttctgaacaaaaattgaaatacgaacgtaatttgga
ataaattttggaaatgcgatttttgaaatttctgaacatattttgaaaacaaaaaa
ctttaaaaggtaaaataaaaataaaataaaaatagaaacataaaaataagcaaaaaata

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FIG. 10 D

```
aaagaaatccgagaaaagccaactgggaatagcacatggaaaaacccagccgtccgccgc
actgtgtaaagctataagtgagccggcccaagcctcgtcgtctcatcataccctgtgcga
aaccccgacaattcgttgcactatgcggcgaataggcttttccaggagctcctgtcttcc
ggttatgggtcatttgcacacccctcctccacttgggccaggctattatacttttttttcc
ttctttcgacctcacgttactacgccagtttagtttttggaagcgaccaaccggttttgt
gaaggttctagaaactcaaccatttttgggaagcttctagaagcctatgaatgtttcttt
tggacatgtattatttgtgtttttttctttttcaaattgcacaatctttttttcaaattcat 5400
gatttttgtgaaacttgtgatttttttgaatccgtgatttttttttcctaaatccgtgtttt
gaaaaaaactgtggacttttccgaaattaatgaacatttgtttgcaagatcgatgatcct
tttcaaatgagcgatttttttctaaaatatccacatatttttcatattcataagctttcc
ttttaatcgtgaactatcttagcatttggtgaacttttattaattttctttataaaatga
ttttttttcaaaagccaacggttaacggttgaccgctgaaccacaaccacaaaccgggga
aaccattgactcgctgaacagggcagggctttcatatgattgggtggtctaataccagcg
cccctgactactaaacgaaggaattgcaaattttaccaaccactactatggtaaaaaatg
aatatcacgataaaaaaggggaaaaaaaactataccctgaaaatccctctgtttctaaat
atttgttgttggggagaactaatctgaaagaactaatctagttctccgcaataacaaata
ttatgattcggggggagtataactattacacgatcaaccaaagaatgtcctccaagaaaa 6000
acccaaagaaagtgctagagttttgttttcaaggaccgaaagatagagatagcattctga
attaggtccatctttttcccaaggattgaaagaaagagatagaattctgaattaggtgcg
gagatatcatttctggattaggtacaattgttttgccggcacagccaaaccccgcagtgg
agccggaattggaattgagtgggtggagtcgagaagcatggttcatgcgttctcaaagag
tgtagccagtagtgtgtgctccttggtgctggagctgcatatacaagtacataaaacaaa
gacgatcagctggcagcgtgcctgcatgcgtgcttcttgctgccgccccggaagccccgg
ttgatgtgcgcaggcgagtggcgacggaccgacggctataaagcacggccaagcaccgc
cgccgttctcaatccatccatcccttagctgatttgATTGACTAGCTAGTTCATTCCCTG

CCACACTGCTAGTACTCCTCCTCGTTTCCTCGTGGCAATGGTACACCAGAGCAACGGCCA
                                          M  V  H  Q  S  N  G  H   NAAT-A

CGGCGAGGCCGCCGCCGCCGCCGCCAACGGCAAGAGCAACGGGCACGCCGCCGCCGCGAA 6600
  G  E  A  A  A  A  A  A  N  G  K  S  N  G  H  A  A  A  A  N

CGGCAAGAGCAACGGGCACGCGGCGGCGGCGGCGGTGGAGTGGAATTTCGCCCGGGGCAA
  G  K  S  N  G  H  A  A  A  A  A  V  E  W  N  F  A  R  G  K

GGACGGCATCCTGGCGACGACGGGGGCGAAGAACAGCATCCGGGCGATACGGTACAAGAT
  D  G  I  L  A  T  T  G  A  K  N  S  I  R  A  I  R  Y  K  I

CAGCGCGAGCGTGGAGGAGAGCGGGCCGCGGCCCGTGCTGCCGCTGGCCCACGGTGACCC
  S  A  S  V  E  E  S  G  P  R  P  V  L  P  L  A  H  G  D  P

GTCCGTGTTCCCGGCCTTCCGCACGGCCGTCGAGGCCGAGGACGCCGTCGCCGCCGCGCT
  S  V  F  P  A  F  R  T  A  V  E  A  E  D  A  V  A  A  A  L

GCGCACCGGCCAGTTCAACTGCTACGCCGCCGGNNTCGGCCTCCCCGCCGCACGAAGgta
  R  T  G  Q  F  N  C  Y  A  A  G  V  G  L  P  A  A  R  S


acatttacagcttcaccgtaatgtatgcgtgagcatgcatgcgccggtttacttacgtgc
ccgccgctgttcttccccggtgcgttcaaaattttaaccttctataagtaccttataaaa
acaaacagCGCCGTAGCAGAGCACTTGTCACAGGGCGTGCCCTACAAGCTATCGGCCGAC
          A  V  A  E  H  L  S  Q  G  V  P  Y  K  L  S  A  D
```

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FIG. 10 E

```
GACGTCTTCCTCACCGCCGGCGGAACTCAGGCGATCGAAGTCATAATCCCGGTGCTGGCC
 D  V  F  L  T  A  G  G  T  Q  A  I  E  V  I  I  P  V  L  A

CAGACTGCCGGCGCCAACATACTGCTTCCCCGGCCAGGCTATCCAAATTACGAGGCGCGA 7200
 Q  T  A  G  A  N  I  L  L  P  R  P  G  Y  P  N  Y  E  A  R

GCGGCATTCAACAAGCTGGAGGTCCGGCACTTCGACCTCATCCCCGACAAGGGGTGGGAG
 A  A  F  N  K  L  E  V  R  H  F  D  L  I  P  D  K  G  W  E

ATCGACATCGACTCGCTGGAATCCATCGCCGACAAGAACACCACCGCGATGGTCATCATA
 I  D  I  D  S  L  E  S  I  A  D  K  N  T  T  A  M  V  I  I

AACCCAAACAATCCGTGCGGCAGCGTTTACTCCTACGACCATCTGGCCAAGgttttgcat
 N  P  N  N  P  C  G  S  V  Y  S  Y  D  H  L  A  K

ccatgcatcctctgcctcgttgatcgaccggtctgtttgaacatagtatatggattgcgt
ttgctaatcgtgtgctgatgatgctgtttggttatcagGTCGCGGAGGTGGCAAGGAAGC
                                       V  A  E  V  A  R  K

TCGGAATATTGGTGATCGCTGACGAGGTTTACGGCAAACTGGTTCTGGGCAGCGCCCCGT
L  G  I  L  V  I  A  D  E  V  Y  G  K  L  V  L  G  S  A  P

TTATCCCGATGGGCGTCTTTGGGCACATTGCCCCGGTCTTGTCCATTGGATCTCTGTCCA
F  I  P  M  G  V  F  G  H  I  A  P  V  L  S  I  G  S  L  S

AGTCGTGGATAGTGCCTGGATGGCGACTTGGATGGGTGGCGGTGTACGACCCCACAAAGA
K  S  W  I  V  P  G  W  R  L  G  W  V  A  V  Y  D  P  T  K

TTTTAGAGAAAACTAAGgtagctttagctccctatcattcttctcatatgctactgtggg
I  L  E  K  T  K

gattagtatttttgctaaatttgtactgcctttgtttattcagATCTCTACGTCTATTAC 7800
                                             I  S  T  S  I  T

GAATTACCTTAATGTCTCAACGGACCCAGCAACCTTCGTTCAGgttagtctttggttctt
  N  Y  L  N  V  S  T  D  P  A  T  F  V  Q
gccctattttgctcatgtccctgtgttgcatgtcaaatgaccggcttcaagttagtatat
agagtttttgttaagtgtgaatgtcgaagtccaacatgatggaagaaagatacatctatt
tttagtcattcccctttgtttgtttgattccataaaataaataaacacaaagccagaacc
aactattgaatagaactatttttcttagaaaatatacattgtattttgagcatgccatat
tcttttcgatcaagtatgcaatatattaaaacttgcattgtactacgagtataccatgtt
gttaagaatttctttacctacaacaccttgtctcgcatcttcatattttgatatccttga
cattattgttctcttatgattcacacaacttaattatggatttttgtgctatcaaattgt
ttagGAAGCTCTTCCTAAAATTCTTGAGAACACAAAAGCAGATTTCTTTAAGAGGATTAT
    E  A  L  P  K  I  L  E  N  T  K  A  D  F  F  K  R  I  I

TGGTCTACTAAAGGAATCATCAGAGATATGTTATAGGGAAATAAAGGAAAACAAATATAT 8400
  G  L  L  K  E  S  S  E  I  C  Y  R  E  I  K  E  N  K  Y  I

TACGTGTCCTCACAAGCCAGAAGGATCGATGTTTGTAATGgtaagctaagcatagactta
  T  C  P  H  K  P  E  G  S  M  F  V  M
```

FIG. 10F

```
ctttttaaggttaatctgggatctcagtgcatccaacaaacaatcaaatcaaaatataat
tatgttttgctatggatctttttgaagatgcatgcatttgaagaataatgaagagagttg
aaattattttaggactaatcttcctgatatcatttgtccatttttttgttattactgtaa
attggtaacactcaaatcatattacaaaagtttcctcccatttttagtaagattgactt
cctttctataaccatgtattaacttccatgtaaacagGTCAAACTAAACTTACATCTTTT
                                      V  K  L  N  L  H  L  L

GGAGGAGATCCATGACGACATAAATTTTTGCTGCAAGCTCGCAAAGGAAGAATCTGTAAT
 E  E  I  H  D  D  I  N  F  C  C  K  L  A  K  E  E  S  V  I

TTTATGTCCAGgtaggaatgtatatggccattttaaaggaaaactatatggaataataat
 L  C  P

atcttcttgttatactaaacaatacttcctccatcctaaaataaatgtcttacacttagc
acaattttatactagatctagtacaaagttgaaacagttattttgggacagagggagtag 9000
tatatattgtgtgagaacataaggttatgtttgactgatatatgcttcttaaatgtgaaa
catgttctcttatgtttttttgattgtatacgaagttcttatcagtttccgagatgactac
acataaatgattaccatatcattgtcagaaaatgtattaccacattagaatattctttct
ttttatgcaaagactagcatggcatgtacttttccttgtacctatgtgtcttttttttttc
tcgttacatgtttgtgcttctcacaaaaataataataccaagcacatgttccaaatgatt
attaataattttgaggtgtttttcaaccaacttatatactttcatagttctaaaaaaacc
gtatatatggttaactctaacaaaaacttatatatgttttctctctaatacagGGAGTGT
                                                      G  S  V

TCTTGGAATGGAAAATTGGGTCCGTATTACTTTTGCCTGCGTTCCATCTTCTCTTCAAGA
 L  G  M  E  N  W  V  R  I  T  F  A  C  V  P  S  S  L  Q  D

TGGACTCGAAAGGGTCAAATCATTCTGTCAAAGGAACAAGAAGAAGAATTCTATAAATGG
 G  L  E  R  V  K  S  F  C  Q  R  N  K  K  K  N  S  I  N  G

TTGTTAGTTGTACACACCCCTAGTTGTACATCTGACTGAAGCTGTAAATCATTTCTAGTT 9600
 C  *
ATCCCCATTTATATATTTCAATAAAACATATTGTAATGGTTCTGTTGTAGCTGTCCAAGT

CATGTACTCTACTTTTTGATGTATTTGGCCTCATTGCCTTGCATCAGTTTCAATAAAAAT

GGTTGTGTACACaatgatgatgtagaggcgaggtgttttgaccaccttttcaacaaaaat

ctatatctttcaacaaatgaaaccttgagttccctttgagtagaagtcaacatactcctt
gaatatgctatggtttccatggtctggatgaaacatgatgaatagaagtgaagttatatc
catgtcaaagtttttaatgtttaatttcattatgagaactttgatattacttctagcac
acattctctgaagtaattgtcagtttggtacttgaaggacctatatttttcctattggg
gggggggggtgaataggcggtttataaccaattgtatatttgagaatatcttaatgtgga
attaaactaggtgaatatttttttccaataaagggtgcttttattgactcacaatgtacca
tcaagggatacaatcataatgagtacacaatcgacatctacataatcaggttgcatacgg 10200
ccaacacacacacacgcacacacacattcacacacacaaatcatgctgacgaagagcgaa
gtcatacaagatcaaaactatgcctaggcggaggaagaatagaaaaacatgaagaaatga
aaaaccgtgactgacaacatactgaccatcgacgacaaacatctgtagacaacacaaaaa
ctgcgagaaaagttctataaaactggcgccttcgagaaggaaacgacgtgcaagagttgc
catcatcggatccaaccactaaggtcatatcctgggttttcatcctgaagatcaaatccg
agcaaactccgagtaatgtctttattagggtaacgattcaaaaaatgccacaatcatgag
```

FIG. 10G

ttatgaccaattagaccagacctaggatttttatccaaagctcgagacgggtactctaga
agtaccatccaattgaagtcatcccacttgcctcaatacaaatagttgcatagatgcacg
gtccatatggcgagtaatggacatgagcgcgcatgtgtaggttaacgtgacgtgacaaga
gcctgtcgccaccactcgacgaagtgtttgatggggaggaagaagtatggctccaccaac 10800
atcccaagtttgaaacattctagagccccttaccatactcacaaagcgacaattgatgac
tatctgtatcagacgacaaatccatgtccgtcactcgctctatcttggtcattgacatac
tacctggcaaaggcggattcaagccccagacagcctgggcggccgc

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